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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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4525 GLEN MEADOWS PLACE
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EXAMINER

WHITTINGTON, ANTHONY T

ART UNIT	PAPER NUMBER
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2133

DATE MAILED: 06/12/2003

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/767,894

Applicant(s)

MCCARTHY ET AL.

Examiner

Anthony T Whittington

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5, 6-14, 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Sobey (U.S. 5, 856,986).

As per claim 1, Sobey teaches a method for encoding data comprising all the elements of the instant application. Sobey teaches identifying a dominant error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(identifying a dominant error). Sobey teaches determining a range of user values corresponding to a maximum error in column 9, lines 1-3: "Table 1 lists...error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error). Sobey teaches assigning values to a first and second codeword and reading the first codeword as the second codeword based on error detection (403, 412, 422) in Figure 17.

As per claims 5, 6 and 16, Sobey teaches a plurality of user values to single code word (403) in Figure 17. Sobey teaches m-ary code in Figure 16a.

As per claims 7-9, Sobey teaches a first dominant error that occurs with a codeword, and an error more likely to occur than any other error with the high probability of occurrence in column 9, lines 1-3: "Table 1 lists the approximate probabilities of error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error).

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As per claim 10, Sobey teaches first and second dominant errors are equally likely to occur in Table 1.

As per claim 11, Sobey teaches a channel of a computer disk drive in column 1, lines 22-24: "Figure 2 illustrates a portion of a data sector...a hard disk drive"(channel of a computer disk drive).

As per claim 12, Sobey teaches a method for developing an error minimizing code for use in connection with a system having a communications channel comprising all the elements of the instant application. Sobey teaches determining a first dominant error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(determining a dominant error). Sobey teaches determining a maximum tolerable deviation in column 10, lines 31-44: "particular 18 bit sync field patterns...over the range R1 ...to R4...is points -1 to -14"(determining a maximum tolerable deviation). Sobey teaches identifying a first code word and assigning the code words to a first group of interdependent code words in Table 3 (column 10). Sobey teaches assigning a first set of user values to a group of interdependent code words (403, 412, 422) in Figure 17.

As per claim 13, Sobey teaches determining a first and second dominant error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(determining a dominant error).

As per claim 14, Sobey teaches assigning second set of user values to a second set of code words in Table 3 (column 10). Sobey teaches determining a maximum tolerable deviation in column 10, lines 31-44: "particular 18 bit sync field patterns...over the range R1 ...to R4...is points -1 to -14"(determining a maximum tolerable deviation).

As per claim 17, Sobey teaches a communication channel that tolerates received and transmitted data in column 1, lines 22-24: "Figure 2 illustrates a portion of a data sector... a hard disk drive"(data tolerant channel of a computer disk drive).

As per claim 18, Sobey teaches writing a first code word to an embedded run out correction field in Figures 1 and 2. Sobey teaches a second word received by a detector (sync detector) in Figure 7.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2-4,15,19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sobey (U.S.5, 856,986) in view of Cox et al. (U.S. 6,446,234).

As per claims 2, Sobey substantially teaches a method for encoding data comprising all the elements of the instant application. Sobey teaches identifying a dominant error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(identifying a dominant error). Sobey

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teaches determining a range of user values corresponding to a maximum error in column 9, lines 1-3: "Table 1 lists...error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error). Sobey teaches assigning values to a first and second codeword and reading the first codeword as the second codeword based on error detection (403, 412,422) in Figure 17. Sobey does not explicitly disclose assigning a third user value to a third code word.

However Cox et al., an analogous art, teaches multiple code words and assigning a third user value to a third code word in column 7, lines 52-53: "We will assume the third codeword...is 0".

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

As per claim 3, Sobey substantially teaches a method for encoding data comprising all the elements of the instant application. Sobey teaches identifying a first and second dominant error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(identifying a dominant error). Sobey teaches determining a range of user values corresponding to a maximum error in column 9, lines 1-3: "Table 1 lists...error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error). Sobey teaches

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assigning values to a first and second codeword and reading the first codeword as the second codeword based on error detection (403, 412,422) in Figure 17. Sobey does not explicitly disclose assigning a third user value to a third code word.

However Cox et al., an analogous art, teaches multiple code words and assigning a third user value to a third code word in column 7, lines 52-53: "We will assume the third codeword...is 0".

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

As per claim 4, Sobey substantially teaches a method for encoding data comprising all the elements of the instant application. Sobey teaches identifying a first and second dominant error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(identifying a dominant error is greater than two times). Sobey teaches determining a range of user values corresponding to a maximum error in column 9, lines 1-3: "Table 1 lists...error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error). Sobey teaches assigning values to a first and second codeword and reading the first codeword as the second codeword based on error detection (403, 412,422) in Figure 17. Sobey does not explicitly disclose excluding a fourth codeword.

However Cox et al., an analogous art, teaches multiple code words and assigning a third user value to a third code word and excluding a fourth codeword in column 7, lines 52-53: "We will assume the third codeword...is 0".

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

As per claim 15, Sobey substantially teaches a method for encoding data comprising all the elements of the instant application. Sobey teaches identifying a first and second dominant error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(identifying a dominant error is greater than two times). Sobey teaches determining a range of user values corresponding to a maximum error in column 9, lines 1-3: "Table 1 lists...error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error). Sobey teaches assigning values to a first and second codeword and reading the first codeword as the second codeword based on error detection (403, 412,422) in Figure 17. Sobey does not explicitly disclose excluding a third codeword.

However Cox et al., an analogous art, teaches multiple code words and assigning a third user value to a third code word and excluding a third codeword in column 7, lines 52-53: "We will assume the third codeword...is 0".

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Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

As per claim 19, Sobey substantially teaches an apparatus having data encoded to an error minimizing scheme comprising all the elements of the instant application. Sobey teaches a communication channel that tolerates received and transmitted data in column 1, lines 22-24: "Figure 2 illustrates a portion of a data sector... a hard disk drive"(data tolerant channel of a computer disk drive). Sobey does not explicitly disclose a decoder.

However Cox et al., an analogous art, teaches a decoder (RS decoder, 156) in Figure 1C. Cox et al. refers to Figure 1C in column 3, line 65 through column 4, line 14.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

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As per claims 20 and 21, Sobey substantially teaches an apparatus having data encoded to an error minimizing scheme comprising all the elements of the instant application. Sobey teaches a first dominant transmission error in column 9, lines 6-7 that states: "Table 1 approximates dominant error"(determining a dominant error). Sobey teaches a range of user values in column 9, lines 1-3: "Table 1 lists the approximate probabilities of error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error).

Sobey does not explicitly disclose assigning a third user value to a third code word.

However Cox et al., an analogous art, teaches multiple code words and assigning a third user value to a third code word in column 7, lines 52-53: "We will assume the third codeword...is 0".

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

As per claim 22, Sobey substantially teaches an apparatus having data encoded to an error minimizing scheme comprising all the elements of the instant application. Sobey teaches a communication channel that tolerates received and transmitted data in column 1, lines 22-24: "Figure 2 illustrates a portion of a data sector...a hard disk drive"(data tolerant channel of a

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computer disk drive). Sobey teaches encoded data comprising of binary code in Table 3(column 10). Sobey does not explicitly disclose a decoder.

However Cox et al., an analogous art, teaches a decoder (RS decoder,156) in Figure 1C. Cox et al. refers to Figure 1C in column 3,line 65 through column 4, line14.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

As per claims 23 and 24, Sobey substantially teaches an apparatus having data encoded to an error minimizing scheme comprising all the elements of the instant application. Sobey teaches a communication channel that tolerates received and transmitted data in column 1, lines 22-24: "Figure 2 illustrates a portion of a data sector...a hard disk drive"(data tolerant channel of a computer disk drive). Sobey teaches a first dominant error that occurs with a codeword, and an error more likely to occur than any other error with the high probability of occurrence in column 9, lines 1-3: "Table 1 lists the approximate probabilities of error for each type of detector over a range of threshold settings"(the threshold are a range of user values for a maximum error)., Sobey teaches first and second dominant errors are equally likely to occur in Table 1. Sobey does not explicitly disclose a decoder.

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However Cox et al., an analogous art, teaches a decoder (RS decoder, 156) in Figure 1C. Cox et al. refers to Figure 1C in column 3, line 65 through column 4, line 14.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Sobey's system by combining Cox et al.'s multiple code words with Sobey's system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use the multiple codeword encoding scheme to generate CRC values for determining whether the error has been corrected, as suggested by Cox et al. in column 1, lines 55-62.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of art with respect to data encoding in general:

U.S. Pat No. 5,802,118 to Bliss et al.

U.S. Pat No. 6,240,538 to Dent et al.

U.S. Pat No. 6,158,027 to Bush et al.

U.S. Pat No. 6,400,728 to Ott

U.S. Pat No. 6,373,407 to Nishiya et al.

U.S. Pat No. 6,353,315 to Egan et al.

U.S. Pat No. 6,546,515 to Vary et al.

U.S. Pat No. 6,530,055 to Fukunaga

U.S. Pat No. 6,566,615 to Pon

U.S. Pat No. 6,201,840 to Rub et al.

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U.S. Pat No. 6,040,953 to Malone et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony T Whittington whose telephone number is 703-306-5617. The examiner can normally be reached on Monday-Friday 7:30a.m.-4:00p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on 703-305-9595. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.



A.W.
June 4, 2003



PHUNG M. CHUNG
PRIMARY EXAMINER